Clinical Ophthalmology

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ORIGINAL RESEARCH

# Accuracy of Modern and Traditional Intraocular Lens Power Calculation Formulas in Pediatric Cataract Surgery

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**Purpose:** To compare the accuracy of modern intraocular lens (IOL) power calculation formulas with that of older formulas, such as SRK/T and Hoffer Q, in pediatric cataract surgery.

**Methods:** This retrospective study included 100 eyes of 100 children who underwent routine cataract surgery with primary IOL implantation in a bag. This study used four IOLMaster 700 integrated formulas: SRK/T, Hoffer Q, Haigis, and Barrett Universal II (BUII). In addition, the following formulas were used: EVO 2.0, Hill RBF 3.0, Hoffer QST, Kane, and PEARL DGS, which are available online.

**Results:** There was a statistically significant difference between SRK/T and most other formulas, except for Hoffer Q, Hoffer QST, and BUII ($p < 0.05$). SRK/T yielded the lowest median absolute error (MedAE) of 0.63 D. This was followed by the BUII (0.66 D), Hoffer Q, and Hoffer QST (0.68 D). SRK/T also yielded the highest percentage of cases within ± 0.50 D (43% of the cases). For patients aged 2 to 5 years, SRK/T formula yielded statistically significantly better results than all other included formulas ($p < 0.05$) with MedAE = 0.44 D, 58.33% and 87.50% of the cases were within ± 0.50 D and ± 1.0 D of intended refraction, respectively.

**Conclusion:** The SRK/T formula showed the best IOL power calculation results in pediatric cataract surgery, followed by BUII, Hoffer Q, and Hoffer QST. In children aged 2–5 years, the SRK/T formula outperformed all other formulas, followed by the BUII and Hoffer QST formulas. In children older than 5 years, there was no statistically significant difference between the different formulas ($p > 0.05$); Hoffer Q and SRK/T showed slightly better MedAE in this age group (5–10 years).

**Keywords:** pediatric biometry, IOL calculation, haigis, Barrett universal II, SRK/T, EVO 2.0, hill RBF 3.0, Kane, Hoffer QST

## Introduction

Pediatric cataract surgery with primary intraocular lens (IOL) implantation in the posterior chamber is the standard treatment for pediatric cataracts.[1,2] The calculation of IOL power in the pediatric age group remains challenging. Emmetropia or undercorrection is essential for achieving the desired postoperative target refraction.[3–7] The current derivation of the IOL power calculation formulas was deduced from adult eyes. However, pediatric eyes are not just small adult eyes. This might be the reason for refractive surprises and less accurate outcomes in the pediatric age group. Most surgeons aim for under-correction, thus leaving the eye with a postoperative hyperopic error that differs according to the age of the child to compensate for the postoperative myopic shift and axial length growth that will occur.[7–11]

Many modern IOL power calculation formulas are currently available, with few articles testing their accuracy in the pediatric age group.[12–15] The current study aimed to compare the accuracy of modern IOL power calculation formulas with older formulas, such as SRK/T and Hoffer Q, in pediatric cataract surgery.



Received: 5 April 2024
Accepted: 13 June 2024
Published: 20 June 2024

## Materials and Methods

This retrospective study included 100 eyes of 100 children who had undergone routine cataract surgery with primary IOL implantation in the bag. Patients were recalled at the final follow-up visit. The parents of the children signed an informed consent form in which they agreed to participate. If a child had undergone bilateral surgery, only one eye was included in the study to avoid duplication of the data. This study was approved by the local ethics committee of the Faculty of Medicine of Alexandria University, Alexandria, Egypt. This ethical code is based on the tenets of the Declaration of Helsinki. Children were excluded from the study if they had incomplete data records, aphakic eyes, secondary IOL implantation, ciliary sulcus IOL implantation, or intraoperative complications affecting IOL position, thus affecting the postoperative refractive outcome.

The medical records were revised (April 2020 to December 2023) and data were collected, including the child's age, sex, type and power of the implanted IOL, biometric data of the eye including axial length, keratometric readings, anterior chamber depth (ACD), white-to-white diameter, and any other relevant data. Biometric measurements were obtained, when possible, using an IOLMaster 700 optical biometer (Carl Zeiss, Meditec, Jena, Germany) version 1.88.1.64861. Contact A-scan biometry using an EZ Scan AB5500+ (Sonomed Inc., New York, N.Y., USA) was performed when optical biometry was not possible. Uncooperative children were examined under general anesthesia to obtain biometric measurements. The measurements were taken by an experienced operator with very minimal pressure to have no or very little effect on the axial length. The average of 3 good quality measurements was calculated.

Target refraction was determined according to the surgeon's preference guided by the rules of Dahan and Drusedau.[7] Around 10% undercorrection for ages 2 to 7 years was targeted and emmetropic target was aimed at after the age of 7 years, which was sometimes adjusted to match the other eye's refraction.

All surgeries were performed by the same surgeon (N.E.) with a reproducible technique. The children underwent irrigation aspiration of the cataract with primary implantation of a single-piece hydrophobic acrylic foldable IOL in a bag (AcrySof SA60AT, Alcon Laboratories, Inc.) under general anesthesia. Primary posterior capsulotomy and anterior vitrectomy were performed to avoid posterior capsule opacification (PCO) which is common in pediatric patients.

Postoperative refractive error was recorded at a visit 4–5 weeks after surgery. The cooperative child was examined using autorefractometry, while streak retinoscopy was performed for the uncooperative children. The refractive error was then converted to spherical equivalent (SE) and recorded (SE = spherical power + cylinder power/2).

The outcomes of multiple IOL power calculation formulas were calculated. This study used four IOLMaster 700 integrated formulas: SRK/T, Hoffer Q, Haigis, and Barrett Universal II (BUII). The following formulas were used: EVO 2.0, Hill RBF 3.0, Hoffer QST, Kane, and PEARL DGS, which are available online on the website of the European Society of Cataract and Refractive Surgery (ESCRS) IOL calculator (https://iolcalculator.escrs.org/). The Kane formula is available online at www.iolformula.com. The formula used regression analysis and artificial intelligence (AI) were used to improve the results.[16] The PEARL-DGS (Postoperative spherical Equivalent prediction using ARtificial intelligence and Linear algorithms, developed by Debellemanière, Gatinel, and Saad) formula is also available online at: www.iolsolver.com.[17] The Hill Radial Basis Function (RBF) 3.0 is based on artificial intelligence and is entirely data-driven and free of calculation bias; it is also available online at https://rbfcalculator.com/online/index.html.[18] EVO (Emmetropia Verifying Optical) 2.0, which is a modern thick-lens formula (unpublished) based on the theory of emmetropization, which is also available online at https://www.evoiolcalculator.com/calculator.aspx. Hoffer QST is the evolution of the Hoffer Q formula improved by artificial intelligence and is also available online at https://hofferqst.com/.[19] The updated formula constants installed in the above-mentioned version of the IOLMaster 700 were used for other non-integrated IOL calculation formulas. The initial A-constant used was 118.8 for most formulas. For the Hoffer Q and Hoffer QST formulas, the initial pACD is 5.44. For the Barrett Universal II formula, the initial Lens Factor (LF) is 1.78. For the Haigis formula the initial constants were as follows: A0 = −0.1111, A1 = +0.249, and A2 = +0.179.

Refractive prediction error (PE) was calculated as follows: (PE = formula-predicted refraction – actual postoperative refraction). The absolute prediction error (APE) was obtained by converting the PE to an absolute value. The primary outcome included median absolute prediction error, mean absolute prediction error, and percentage of cases within 0.5 D, 1 D and 2 D from the intended refraction.

Data analysis was performed using the Social Sciences SPSS Statistics for Windows (version 26.0; SPSS Inc., Chicago, IL, USA). Quantitative data were described using the range, median, mean, and standard deviation. Normality of the data was evaluated using the Kolmogorov–Smirnov test. The Friedman's ANOVA test was used to compare different means. The Wilcoxon signed-rank test for paired samples was used to compare medians of the same group. The chi-square test was used to compare the number of cases within the intended target refraction. Differences were considered statistically significant when the associated p-value was less than 0.05.

## Results

This study included 100 eyes of 100 children. The mean age was 5.6 ± 2.3 years (range, 2–10 years). This study included 51 males and 50 females. Table 1 presents the demographic data and biometric characteristics of the included patients. All included patients were older than two years of age.

Table 2 lists the outcome of different formulas among the included eyes showing the mean and median absolute errors. The number of cases within ± 0.50 D, ± 1.0 D, and ± 2.0 D of intended target refraction are also shown in Table 2. The Friedman's ANOVA test was used to compare different means. The difference was statistically significant ($p < 0.05$). The Wilcoxon signed-rank test for paired samples was used to compare different medians. There was statistically significant difference between SRK/T and most of the other formulas except for Hoffer Q, Hoffer QST, and Barrett Universal II ($p < 0.05$). There was no statistically significant difference between Hoffer Q and Hoffer QST ($p > 0.05$). Chi-square test was used to compare different numbers of cases within intended target refraction. The difference was not statistically significant ($p > 0.05$). SRK/T yielded the lowest median absolute error (MedAE) of 0.63 D. This was followed by Barrett Universal II (0.66 D) then Hoffer Q and Hoffer QST (0.68 D). SRK/T also yielded the highest percentage of cases within ± 0.50 D (43% of the cases). This was followed by Barrett Universal II and Hoffer QST (39% of the cases). Haigis and PEARL DGS formulas showed the highest MedAE (0.79 D). Haigis formula yielded the least number of cases within ± 0.50 D of intended refraction (29% of cases) followed by Kane and PEARL DGS formulas (31% of cases).

The included cases were divided into two groups for subgroup analysis. The first group included children aged 2–5 years (N =48). The second group included children aged 5–10 years (N =52). Table 3 shows the outcomes of the different formulas in the first subgroup of patients aged 2–5 years. SRK/T formula yielded statistically significantly better results than all other included formulas ($p < 0.05$) with median absolute error MedAE = 0.44 D, 58.33% and 87.50% of the cases were within ± 0.50 D and ± 1.0 D of intended refraction, respectively. Barrett

**Table 1** Demographic Data and Biometric Characteristics of the Included Eyes (n=100)

| | **Mean ± SD (Range) (n = 100)** |
|---|---|
| **Age (years)** | 5.6 ± 2.3 (2.0–10.0) |
| **Sex (Male: Female)** | 51: 50 |
| **Axial length (mm)** | 22.25 ± 0.87 (20.06–24.03) |
| **Average Keratometry (D)** | 44.28 ± 1.30 (42.25–48.25) |
| **Anterior chamber depth (mm)** | 3.14 ± 0.20 (2.69–3.66) |
| **White to white diameter (mm)** | 11.30 ± 0.23 (10.90–11.80) |

**Table 2** Outcome of Different Formulas Among the Included Eyes (n=100)

| (n=100) | Mean Absolute Error ± SD (Range) (D) | Median Absolute Error (D) | Cases within ± 0.50 D (%ge) | Cases within ± 1.0 D (%ge) | Cases within ± 2.0 D (%ge) |
|---|---|---|---|---|---|
| **SRK/T** | 0.73 ± 0.55 (0.03–2.61) | 0.63 | 43% | 72% | 96% |
| **Hoffer Q** | 0.80 ± 0.59 (0.00–2.40) | 0.68 | 33% | 69% | 94% |
| **Haigis** | 0.87 ± 0.60 (0.00–2.54) | 0.79 | 29% | 65% | 93% |
| **Barrett Universal II** | 0.83 ± 0.61 (0.06–2.46) | 0.66 | 39% | 67% | 94% |
| **EVO 2.0** | 0.86 ± 0.61 (0.03–2.54) | 0.77 | 32% | 62% | 93% |
| **Hill RBF 3.0** | 0.88 ± 0.62 (0.00–2.54) | 0.73 | 34% | 65% | 91% |
| **Hoffer QST** | 0.76 ± 0.58 (0.01–2.43) | 0.68 | 39% | 66% | 94% |
| **Kane** | 0.86 ± 0.61 (0.01–2.49) | 0.74 | 31% | 63% | 94% |
| **PEARL DGS** | 0.87 ± 0.62 (0.06–2.64) | 0.79 | 31% | 61% | 92% |

**Table 3** Outcome of Different Formulas Among Children 2 to 5 Years of Age (n=48)

| (n=48) | Mean Absolute Error ± SD (range) (D) | Median Absolute Error (D) | Cases within ± 0.50 D (%ge) | Cases within ± 1.0 D (%ge) | Cases within ± 2.0 D (%ge) |
|---|---|---|---|---|---|
| **SRK/T** | 0.53 ± 0.41 (0.03–2.00 | 0.44 | 58.33% | 87.50% | 97.92% |
| **Hoffer Q** | 0.72 ± 0.57 (0.00–2.31) | 0.63 | 35.42% | 81.25% | 93.75% |
| **Haigis** | 0.76 ± 0.58 (0.00–2.35) | 0.64 | 35.42% | 72.92% | 95.83% |
| **Barrett Universal II** | 0.72 ± 0.60 (0.06–2.41) | 0.54 | 47.92% | 79.17% | 93.75% |
| **EVO 2.0** | 0.74 ± 0.57 (0.03–2.35) | 0.69 | 35.42% | 70.83% | 95.83% |
| **Hill RBF 3.0** | 0.74 ± 0.58 (0.00–2.22) | 0.63 | 39.58% | 77.08% | 93.75% |
| **Hoffer QST** | 0.64 ± 0.51 (0.01–2.18) | 0.55 | 47.92% | 77.08% | 97.92% |

(*Continued*)

**Table 3** (Continued).

| (n=48) | Mean Absolute Error ± SD (range) (D) | Median Absolute Error (D) | Cases within ± 0.50 D (%ge) | Cases within ± 1.0 D (%ge) | Cases within ± 2.0 D (%ge) |
|---|---|---|---|---|---|
| **Kane** | 0.72 ± 0.55 (0.00–2.22) | 0.61 | 35.42% | 72.92% | 97.92% |
| **PEARL DGS** | 0.77 ± 0.62 (0.00–2.32) | 0.67 | 35.42% | 66.67% | 93.75% |

Universal II comes next with MedAE = 0.54 D, 47.92% and 79.17% of cases were within ± 0.50 D and ± 1.0 D of intended refraction respectively. Hoffer QST formula showed comparable result to BUII with MedAE = 0.55 D, 47.92% and 77.08% of cases were within ± 0.50 D and ± 1.0 D of intended refraction respectively. There was no statistically significant difference between BUII and Hoffer QST outcomes. EVO 2.0 and PEARL DGS formulas had the highest MedAE (0.69 and 0.67 D respectively).

Table 4 shows the outcomes of the different formulas in the second subgroup with age > 5–10 years. The Friedman's ANOVA test, Wilcoxon signed-rank test, and Chi-square test showed no statistically significant differences between the different formulas ($p > 0.05$). Hoffer Q and SRK/T showed slightly better MedAE (0.73 and 0.77 D respectively). Hill RBF 3.0 and Kane formulas had the highest MedAE (0.88 and 0.87 D respectively).

**Table 4** Outcome of Different Formulas Among Children > 5 to 10 Years of Age (n=52)

| (n=52) | Mean Absolute Error ± SD (Range) (D) | Median Absolute Error (D) | Cases within ± 0.50 D (%ge) | Cases within ± 1.0 D (%ge) | Cases within ± 2.0 D (%ge) |
|---|---|---|---|---|---|
| **SRK/T** | 0.91 ± 0.61 (0.06–2.61 | 0.77 | 28.85% | 57.69% | 94.23% |
| **Hoffer Q** | 0.88 ± 0.59 (0.02–2.40) | 0.73 | 30.77% | 57.69% | 94.23% |
| **Haigis** | 0.97 ± 0.60 (0.03–2.54) | 0.85 | 23.08% | 57.69% | 90.38% |
| **Barrett Universal II** | 0.93 ± 0.62 (0.08–2.46) | 0.82 | 30.77% | 55.77% | 94.23% |
| **EVO 2.0** | 0.98 ± 0.63 (0.04–2.54) | 0.84 | 28.85% | 53.85% | 90.38% |
| **Hill RBF 3.0** | 1.00 ± 0.64 (0.01–2.54) | 0.88 | 28.85% | 53.85% | 88.46% |
| **Hoffer QST** | 0.92 ± 0.61 (0.03–2.43) | 0.83 | 30.77% | 55.77% | 90.38% |
| **Kane** | 0.99 ± 0.63 (0.06–2.49) | 0.87 | 26.92% | 53.85% | 90.38% |
| **PEARL DGS** | 0.96 ± 0.62 (0.01–2.64) | 0.84 | 26.92% | 55.77% | 90.38% |

## Discussion

This study compared the accuracy of modern IOL power calculation formulas, such as Kane, EVO 2.0, Hill RBF 3.0, Hoffer QST, and Barrett Universal II, with older formulas, such as SRK/T, Hoffer Q, and Haigis, in pediatric cataract surgery. Pediatric eyes have shorter axial lengths (AXL), steeper corneas, and shallower anterior chamber depths (ACD). IOL power calculations in pediatric patients are problematic. The currently available IOL power calculation formulas were originally designed for adult eyes and are used in pediatric eyes with variable accuracy. Another issue is postoperative ocular growth, which results in a large myopic shift as the child grows older.[15,20,21]

Optical biometry is the gold standard for AXL measurements with high accuracy and ease of performance. However, this requires patient cooperation, which is sometimes inconvenient in young children. A-scan ultrasound biometry is the conventional method (applanation or immersion) that may require general anesthesia in young infants and uncooperative children. However, the applanation method has the disadvantage of variable corneal compressions.

Several points should be considered when using adult IOL power calculation formulas in pediatric eyes. Pediatric eyes are not just small adult eyes; for example, the anterior segment-to-posterior segment ratio of infants and young children is large because of shallower ACD. Postoperative capsular bag contraction can lead to changes in effective lens position (ELP). The current formulas do not consider the dynamic vitreous pressure and variable sites of IOL implantation. Pediatric eyes have a higher IOL power, which is more sensitive to changes in lens position, causing higher refraction changes. The anterior chamber depth was either assumed from the manufacturer's A-constant or calculated using theoretical formulas based on axial length and biometry. The regression formulas were based on adult biometrics and, when derived, they had very few short eyes. Theoretical formulas are based on the adult schematic eye; they can be theoretically extrapolated better in children by proportionally downsizing the variables to pediatric dimensions.[20–23]

In the current study, the SRK/T formula showed better results for the entire cohort. When subdividing the cases into two groups, SRK/T still showed superiority for patients aged between 2 and 5 years. The SRK/T formulae did not show statistically significant differences in patients aged > 5 years. Irfani et al[22] studied the accuracy of SRK/T formula in pediatric cataract surgery; they reported MAE in age group < 7 years = 1.27 ± 1.18 D. The current study reported better outcomes with SRK/T with MAE = 0.73 + 0.55 D. The better results of the current study can be explained by A-constant optimization. Thanapaisal et al[23] also studied the accuracy of the SRK/T formula in pediatric cataract surgery and reported an MAE = 1.41 of 1.22 D. The reason for the higher MAE might be that they included traumatic and sulcus implantation cases. Therefore, these patients were excluded from the study. The Infant Aphakia Treatment Study[24] also provided MAE = 1.4 ± 1.1 D at one month postoperative when SRK/T formula was used for IOL power calculation, but the mean age of infants of only 2.5 months maybe too young to compare with the current study (all included cases in the study were older than 2 years of age). Zhong et al[15] published a systematic review and meta-analysis on the accuracy of IOL power calculations in pediatric cataract patients. They included five formulas: Holladay 1, Holladay 2, Hoffer Q, SRK/T, and SRK II. They showed that SRK/T had a significantly lower MAE than Holladay 2 (MD: −0.60; 95 CI – 0.93 to – 0.26) for patients aged 24–60 months.

Lin et al[25] evaluated the accuracy of newer-generation IOL power calculation formulas (EVO 2.0, Kane) compared to established formulas (BU II, Haigis, and SRK/T). They concluded that in children aged > 24 months with AXL > 21 mm, the Barrett, EVO, and Kane formulas were relatively accurate, whereas in children aged < 24 months with AXL ≤ 21 mm, EVO was more accurate, followed by the SRK/T formula. They reported the mean PE for all included eyes as follows: Barrett (− 0.30 D), EVO (0.18 D), Haigis (− 0.74 D), Kane (− 0.36 D), and SRK/T (0.58 D) ($p < 0.001$). Reitblat et al[26] published a paper that was the first study to investigate the use of the Kane formula in the pediatric population. They concluded that the Kane formula was among the noteworthy IOL power calculation formulas for this age group. They reported that there were no statistically significant differences in MedAE and MAE between the Kane formula (0.54 D and 0.91 ± 1.04 D) and BUII (0.50 D and 0.88 ± 1.00 D), Hoffer Q (0.48 D and 0.88 ± 1.05 D), SRK/T (0.72 D and 0.97 ± 1.00 D), Holladay 1 (0.63 D and 0.94 ± 1.05 D), and Haigis (0.57 D and 0.98 ± 1.13 D), $p = 0.099$. The results of this study were comparable to those of the current study. This might be due to the similar age range (62 patients aged 6.2 (IQR 3.2–9.2) years.

The current study is the first to publish the results of the Hill RBF 3.0 formula for pediatric cataract surgery. Rastogi et al[27] compared the predictive accuracy of the Hill RBF 2.0 formula with BUII, Hoffer Q, SRK/T, and Holladay 1 formulas in pediatric eyes. They concluded that the Hill RBF 2.0 formula is non-inferior to the Barrett Universal II, Hoffer Q, SRK/T, and

Holladay 1 formulas in pediatric eyes. They reported that the MAEs were 1.08 ± 1.00 D for the Hill RBF 2.0, 1.24 ± 1.20 D for the Barrett Universal II, 1.25 ± 1.06 D for the Hoffer Q, 1.25 ± 1.10 D for the SRK/T, and 1.28 ± 1.01 D for the Holladay 1 formulas. The higher MAEs in this study than in the current study might be related to the different age groups included (99 eyes of 70 children aged 4–18 years). As noted in the current study, subgroup analysis for children aged 5–10 years showed higher MAEs than those for younger children aged group less than 5 years. Lwowski et al[28] evaluated the ESCRS online IOL power calculator in children who underwent lens extraction and primary IOL implantation. They included 60 eyes from 47 patients with a mean age of 6.5 ± 3.2 years They reported that the MedAE was lowest in the SRK/T formula (0.56 D, ± 1.03) performed significantly better (p = 0.037) than Hoffer QST and Kane, followed by BUII (0.64D, ± 0.92), Pearl DGS (0.65D, ± 0.94), EVO (0.69D, ± 0.94), Hoffer QST (0.75D, ± 0.99), and Kane (0.78D, ± 0.99). This study was most similar to the current study. Similar to the current study, they showed that SRK/T still performed better than other newer-generation formulas, followed by Barrett Universal II. However, the Hoffer QST performed better in this study.

The current study has some limitations, some of which were measured using A-scan biometry, while most other cases were measured using optical biometry, and errors may be produced by different apparatuses. Second, some cases were measured under anesthesia, and measurement errors may have occurred. Third, the study did not include patients aged < 2 years or eyes with an axial length of < 21 mm. However, this study had several advantages. First, it included an adequate number of cases. Second, the eyes were divided into two subgroups according to age (under and > 5 years). Third, this is the first study to publish the results of the Hill RBF 3.0 formula for pediatric patients. All surgeries were performed by a single surgeon (N.E.) using a reproducible technique with the same implanted IOL.

## Conclusions

In conclusion, the SRK/T formula showed better IOL power calculation results in pediatric cataract surgery, followed by Barrett Universal II, Hoffer Q, and Hoffer QST. In children aged 2–5 years, the SRK/T formula outperformed all other formulas, followed by the Barrett Universal II and Hoffer QST formulas. In children older than 5 years, there was no statistically significant difference between the different formulas (p > 0.05); Hoffer Q and SRK/T showed slightly better MedAE in this age group (5–10 years).

## Abbreviations

IOL, intraocular lens; MAE, mean absolute error; MedAE, median absolute error; ACD, anterior chamber depth; ELP, effective lens position; D, diopter; BUII, Barrett Universal II; EVO, emmetropia verifying optical; PCO, posterior capsule opacification; SE, spherical equivalent; ESCRS, European society of cataract and refractive surgery; PE, prediction error; APE, absolute prediction error; AXL, axial length; LF, Lens Factor.

## Data Sharing Statement

Available upon request from the authors.

## Ethics

This study was approved by the local ethics committee of the Faculty of Medicine, Alexandria University, Alexandria, Egypt. The tenets of the Declaration of Helsinki were followed for this study. All included patients were recalled for the final follow-up visit, and their parents signed an informed consent form.

## Author Contributions

All authors made a significant contribution to the work reported, whether that is in the conception, study design, execution, acquisition of data, analysis and interpretation, or in all these areas; took part in drafting, revising or critically reviewing the article; gave final approval of the version to be published; have agreed on the journal to which the article has been submitted; and agree to be accountable for all aspects of the work.

## Funding

There is no funding to report.

## Disclosure

The authors report no conflicts of interest in this work.

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